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NEW SPECIES OF PHILIPPINE LIZARDS

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(*Hinigaran, Occidental Negros, Negros, P. I.*)

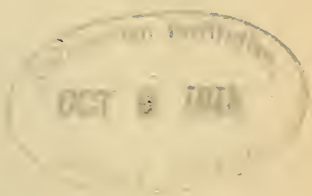
ONE PLATE

This paper is based on the collections made by the Bureau of Science during the past ten years and that made by me during the last two years. The latter collection is by far the larger and more representative. It has been made chiefly in Baguio, Mountain Province; Occidental Negros Province; and Agusan Province, Mindanao.

Most of the new species were taken at Bunauan, in the upper Agusan Valley. So far as I know, no collection has ever been made before in this locality. Hugh Cuming and A. H. Everett collected at various places along the coast of Mindanao during Spanish times; in more recent years Dr. Edgar A. Mearns and Maj. J. M. T. Partello of the United States Army collected in various parts of the interior. New species taken by the two American collectors were sent to the Smithsonian Institution, and some of them have been described by Stejneger.<sup>1</sup>

Bunauan is situated in a great sunken lake and swamp region, and has a remarkable herpetological fauna. More than 120 species were found there and nearly 2,000 specimens were collected; however, about 500 of these were lost in shipping the collection from the interior to the coast. In this lot a few very rare forms, including *Draco mindanensis* Stejneger, *Tropidophorus partelloi* Stejneger, and 2 others, probably new, were lost.

The faunæ of the various islands of the Philippine Archipelago are more or less distinct; that of Palawan, as shown by



<sup>1</sup> *Proc. U. S. Nat. Mus.* (1908), 33, 677; (1908), 34, 199; (1911), 39, 97.

Everett,<sup>2</sup> Boulenger,<sup>3</sup> Griffin,<sup>4</sup> and others, has more species of reptiles in common with Borneo than have the other islands. The large number of species known only from Mindanao suggests that this island has a reptilian fauna peculiar to itself. However, the knowledge of the herpetological faunæ of all the islands is very incomplete.

Fewer than 15 species and varieties of lizards have been described from the Philippine Islands since the publication of Boulenger's catalogue,<sup>5</sup> thirty years ago. In the present paper 14 species are described as new. These are:

<i>Gymnodactylus agusanensis.</i>	<i>Sphenomorphus mindanensis.</i>
<i>Gymnodactylus annulatus.</i>	<i>Sphenomorphus coxi.</i>
<i>Hemidactylus luzonensis.</i>	<i>Sphenomorphus curtirostris.</i>
<i>Ptychozoon intermedia.</i>	<i>Sphenomorphus palustris.</i>
<i>Luperosaurus compresicorpus.</i>	<i>Dasia griffini.</i>
<i>Lepidodactylus aureolineatus.</i>	<i>Tropidophorus rivularis.</i>
<i>Emoia ruficauda.</i>	<i>Dibamus argenteus.</i>

*Dasia semicineta* (Peters) has been redescribed in this paper from a splendid series of specimens. It appears to be distinct from *D. olivacea* Gray, and I doubt if the typical form of the latter occurs in the Islands. The entire collection has not been gone over, and further study will probably bring to light other new species.

Special thanks are due to Dr. Alvin J. Cox, director of the Bureau of Science, and Dr. R. P. Cowles, of the University of the Philippines, for facilitating this work; and to Mr. Artemus L. Day and Mr. S. F. Light, of the University of the Philippines, for checking identifications and assistance rendered in various other ways.

*Gymnodactylus agusanensis* sp. nov.

*Diagnosis.*—Dorsal granules intermixed with numerous large conical or trihedral tubercles, 9 or 10 irregular longitudinal rows on each side; males and females with preanal and femoral pores, those of the female much smaller; preanal pores arranged in a broadly angular series, 5 or 6 on each side; tubercles on the tail arranged in whorls.

*Type.*—No. R. 1686, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

<sup>2</sup> *Proc. Zool. Soc. London* (1889), 220.

<sup>3</sup> *Ann. & Mag. Nat. Hist.* (1894), VI, 14, 81.

<sup>4</sup> *This Journal, Sec. A* (1909), 4, 595; *Sec. D* (1911), 6, 253.

<sup>5</sup> Catalogue of the lizards in the British Museum (Natural History, 2d ed. London (1885), 1 and 2; (1887), 3.

*Description.*—Rostral large, somewhat wider than high, broadly entering the nostril and almost surrounding a quadrangular median scale above, bounded above by 2 supranasals, and 2 small roundish internasals; nostrils large, directed backward with a depressed area immediately behind; nostril surrounded by the rostral, the supranasal, and 2 postnasals; scales on the snout, especially those on the canthus rostralis, much larger than those on the occiput and neck; a depressed area between and delineating the supraorbital regions continues some distance on the snout, giving it the appearance of a “nose;” eyelid not visible around the entire eye; 10 upper labials, first largest; a row of enlarged slightly keeled scales above the upper labials; 11 lower labials; mental triangular, as broad as long, a pair of rectangular chin shields bordering on the first labial and the mental, forming a suture behind the latter; several rows of enlarged scales below the lower labials, first row largest; the remaining scales on chin and throat uniformly granular; auricular opening subtriangular; tympanum deeply sunk; body above with small granules intermingled with 18 or 20 irregular rows of enlarged, conical or slightly trihedral, tubercles of varying sizes; tubercles also on the occiput, arms, legs, and tail; those on the tail arranged in whorls, not continuing to the end of the tail; scales of the tail arranged in more or less regular transverse series; 3 or 4 enlarged tubercles on each side of the anus; a glandular row of tubercles from axilla to groin, giving the appearance of a fold in the skin; ventral scales larger, imbricate, subequal in size; preanal pores in an angular series, 5 or 6 on each side; femoral pores separated from the preanals, from 8 to 10 on each side; several enlarged rows of scales in the preanal region in front and behind the preanal pores; toes with a well-defined crook, and with well-developed transverse lamellæ below, 26 under fourth toe; distance from eye to ear equal to distance from eye to nostril, and slightly greater than the diameter of the eye; hind leg pressed forward reaches between the ear opening and the insertion of the forelegs.

*Color in life.*—Grayish white above with 4 or 5 enlarged, irregular, dark black-brown crossbands, strongly contrasted; tail annulated with broad black rings and narrow white interspaces; a broad dark line from behind the eye joins the dark band which crosses the shoulder; a broad light line from the angle of the mouth to the shoulder; a somewhat darker band below the white line; a narrow white line from behind the upper part of the eye to a point above the ear opening, and across the occiput; head darker than the back, with a few in-

distinct light markings; labials with several small white spots; abdomen and throat yellowish white, powdered with brown; arms and legs marbled with brown; toes with dark and white spots alternating.

*Measurements.*—Total length (extreme end of tail regenerated), 170 millimeters; snout to vent, 88; foreleg, 36; hind leg, 48; width of head, 18.

*Variations.*—Several other specimens taken at the same time vary more or less in the shade of brown or light color. The markings are much the same in all the specimens; in the young the colors are almost pure black and white. In 2 specimens the rostral is fused with the "interrostral." The largest specimen, a female with regenerated tail, has the following measurements: Length, 220 millimeters; snout to vent, 106; foreleg, 40; hind leg, 55; width of head, 23. The preanal and femoral pores of the female are much smaller than those of the male.

*Remarks.*—The occurrence of distinct pores in the female is very unusual. So far as I know this species is unique in the family with regard to this characteristic. Boulenger, in describing the family Geckonidæ, states:<sup>6</sup>

Males are generally distinguished from females by a larger size, the swelling of the base of the tail, and the presence of femoral or præanal pores, which are constantly absent in the latter.

The perforations in the scales are visible to the naked eye. Examination of the underside of the skin with a microscope showed the presence of small glands with well-defined ducts. I have not ascertained whether or not the pores are functional.

It is true that in many genera of this family, while there are no pores in the females, the scales corresponding to the pore-scales of the males are enlarged and differentiated, and it is possible to ascertain to a certain degree of accuracy the number of pores in a male of a species by an examination of female specimens. In *Gecko verticillatus* the pore scales of the females have decided pits, but I have not ascertained whether or not the scales are perforated. This characteristic, I think, does not necessitate the establishing of a new genus, although it may call for a modification of the definition.

*Gymnodactylus annulatus* sp. nov.

*Diagnosis.*—Dorsal granules minute, with from 14 to 16 irregular longitudinal rows of enlarged, conical or trihedral tuber-

<sup>6</sup> Catal. Lizards Brit. Mus. 2d ed. (1885), 1, 5.

cles; males with a V-shaped series of preanal pores, 3 on each side, inclosing a deep pubic groove; no femoral pores; pores wanting in the female; transverse plates under the basal phalanx large and well differentiated, 20 under the fourth toe; 12 to 14 upper labials; 11 to 12 lower labials.

*Type*.—No. R. 1686-7, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July, 1913; E. H. Taylor, collector.

*Measurements*.—Total length, 122 millimeters; snout to vent, 56; width of head, 13; foreleg, 18; hind leg, 25. The largest specimen taken is only 141 millimeters in length.

*Remarks*.—A complete description of this form is hardly necessary, since it agrees in most details with *G. agusanensis* and *G. philippinicus*. It differs from the latter in its smaller size and in having 3 instead of 6 preanal pores on each side not arranged in a parallel series as in *G. philippinicus*. The plates under the basal phalanx are enlarged and clearly differentiated.

This species is very common at Bunauan, but was not observed at Butuan near the coast. More than 40 specimens were taken, all agreeing remarkably well with the type save in the shades of coloration. They were found under rotten logs and usually in pairs. They were dark when found, but quickly became lighter in color when exposed to the sunlight.

#### *Hemidactylus luzonensis* sp. nov.

*Diagnosis*.—Digits free and long, with 2 rows of lamellæ; distal phalanx clawed, arising from the end of the distal portion of the toe; body with about 16 rows of strong, sharply keeled trihedral tubercles; head much flattened.

*Type*.—No. 1774, Bureau of Science collection; Manila, Philippine Islands.

*Description of type*.—Adult female; head noticeably flattened, more than twice as wide as deep, neck especially constricted; rostral squarish and upright, with a slight notch above, and a suture half the width of the scale; a supranasal with a small round internasal; nostril bordered by 2 postnasals, the first labial, the supranasal, and rostral; 11 upper labials; 10 lower labials; mental almost triangular, followed by 2 pairs of greatly enlarged chin shields, the first pair making a long suture behind the mental; a few slightly enlarged scales border the lower labials and the chin shields; head scales unequal, those on snout, especially those in front of eye, largest; a few small scattered tubercles on the occiput; ear opening moderate, vertically oval; back with from 16 to 18 irregular rows of trihedral scales, largest on the sides; tail with whorls of spiny tubercles above,

below with broad transverse scales; tubercles on front legs smaller than those on hind legs; scales on chin and throat small, those on abdomen imbricate and very much larger; 8 lamellæ under longest toe; adpressed hind leg reaches beyond the elbow of adpressed foreleg; distance of ear opening and nostril from the ear, equal.

*Color in formalin.*—Ground color drab-gray with a few scattered brown spots; an elongate dark spot behind the eye; snout with scattered brown spots; below immaculate.

*Measurements.*—Total length (tail mutilated), 60 millimeters; snout to vent, 50; foreleg, 18; hind leg, 24; width of head, 11.

*Remarks.*—The type specimen was obtained from the Manila High School where it was being used for dissection. The abdomen has been opened and the end of the tail lost; otherwise the body is in good condition. There are no pores present, but a series of 12 differentiated preanal scales on each side probably indicates the number of pores in the male. This form is easily distinguished from *H. frenatus* by the longer inner toe, with the claw not sessile, the 8 rows of spiny tubercles on the tail, the narrowed neck, and the increased number and size of tubercles on the back. From *H. depressus* it differs in having the snout twice the diameter of the eye; the ear opening vertical and less than one third the diameter of the eye; the tail not depressed, with angular lateral edge. No other specimen having these characteristics has been seen. The type specimen was taken in Manila by a student of the High School.

*Ptychozoon intermedia* sp. nov.

*Diagnosis.*—Large scales of the dermal lobe on the side of the head equal to, or slightly smaller than, the largest abdominal scales; back with from 10 to 12 irregular longitudinal rows of flat round tubercles; tail with a narrow unsegmented terminal flap, no wider than the nearest lobes, slightly notched behind; annulations on the tail marked by lateral lobes directed somewhat backward, and a series of 4 or more enlarged scales above, much larger than the scales on the lateral lobes.

*Type.*—No. 1776, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July 12, 1912; E. H. Taylor, collector.

*Description.*—Rostral large, rectangular, with a triangular depression in the upper part; the nostril is surrounded by the rostral, the first labial, 2 postnasals, and a rather large supranasal; latter is distinctly triangular and forms a suture with its mate behind the rostral; a large scale lies partly between the

supranasals; a small roundish scale on either side of this and directly behind the supranasals, touching the superior postnasal; 11 upper labials; 10 lower labials; mental much smaller than the rostral or any of the five first lower labials, followed by two postmental scales; latter elongate, widest in the middle; on each side of the postmental a row of scales gradually diminishing in size bordering the labials; scales from the supraocular regions on the head twice as large as those on occiput; latter area with scattered small tubercles; a group of enlarged scales directly in front of the eye, back with uniform granular scales intermixed with flat roundish tubercles, 6 or 7 irregular rows on each side; scales on belly much larger than dorsal scales, or scales on the neck; on each side of the head below the auricular opening is a dermal flap, widest in front of the auricular opening and continues from near the angle of the mouth to some distance on the neck; a similar flap on the foreleg entirely bordering the limb; the dermal flap on the hind leg is wanting from the groin to the knee; on each side of the body a wide dermal flap or parachute, extending from the fore limb, where it joins the flap of the fore limb, and continuing to the groin; tail with a lateral series of small rounded lobes decreasing in size toward the tip and directed backward "saw-tooth" fashion; tail with a flap on the tip, which is scarcely wider than the nearest lobes; each segment of tail with a number of enlarged scales; on the first half these are from 8 to 6 on each segment, on the last half the number is reduced, digits not webbed to the tips; distal phalanx on inner finger and toe replaced by a flattened scale. A series of 10 differentiated preanal scales arranged in a curved line; widely separated from these is a series of differentiated femoral scales 13 to 14 in number; a large scale on each side behind anus.

*Color in life.*—A soft olive gray above with touches of bluish and brown; body transversed with several wavy lines of dark brown. Head more or less flecked with brown; a broad brown band from eye to shoulder; legs indistinctly barred with reddish brown bands; below cream with large indistinct spots under the tail.

*Measurements.*—Total length, 189 millimeters; snout to vent, 92; length of head, 24; height of head, 10; width of head, 21; foreleg, 30; hind leg, 43; width of lateral flap, 8.5; length of femur, 15; greatest body width, 20.

*Remarks.*—This species seems to be intermediate between the two other known species of this genus. From *Ptychozoon kuhli* it differs in the absence of the wide flap at the extremity of

tail, and from *P. horsfeldii* it differs in having dorsal tubercles. The type specimen is a female and has no preanal pores; however, there is a distinct series of differentiated femoral scales, 14 on a side, and an angular series of 12 preanal scales, which leads me to believe that the male when found will have a similar number of femoral and preanal pores. There are 11 upper labials and 10 lower labials; the second lower labial is largest; symphyisial, small and subtriangular. Markings and coloration similar to other species.

This apparently is an extremely rare species, as it is wholly unknown to the Filipinos; were it common, there would be little doubt of its being recognized by them owing to its extraordinary appearance. Only one specimen was taken, although great efforts were made to obtain other specimens in the same and other localities. This is the only record of this genus for the Philippines.

*Luperosaurus compresicorpus* sp. nov.

*Diagnosis.*—Body elongate, compressed, with a very narrow abdominal region; digits with undivided lamellæ; fingers and toes with rudimentary webs; no dorsal tubercles; chin shields very small, undifferentiated.

*Type.*—No. 1781, Bureau of Science collection; Limay, Bataan Province, Luzon. Collector and date unknown.

*Description of type.*—Rostral large, entering the nostril, a very small suture present; 2 supranasals, the first much the larger; a depressed area immediately behind the nostrils; granules on the snout and those behind and below the angle of the mouth equal to, or larger than, dorsal granules; eye large, pupil vertical; ear opening very small; the diameter of the eye equal to its distance from the ear, less than its distance to the end of the snout; 19 or 20 upper labials, 16 lower labials; mental small; chin shields small, numerous, and irregular; a somewhat enlarged row of scales bordering the lower labials; granules on the chin and throat extremely minute; scales on the abdomen juxtaposed, cycloid, and irregular, arranged in more or less regular transverse rows, about 16 in a row; a row of differentiated preanal scales, 7 on each side, probably representing the number of preanal pores in the male; each scale with a distinct depression; an angular row of larger scales immediately behind the pore scales; distal phalanx very short with retractile claws on all save inner finger and toe; undivided lamellæ under digits, 15 or 16 under the fourth finger and an equal number under the



fourth toe; lamellæ as wide at the base as at the end of digit; scales on the underside of tail very irregular in size and shape.

*Color in alcohol.*—Above, light cinnamon-brown, slightly darker on arms and legs; below, immaculate; tail with a slight peppering of cinnamon-brown below. No markings are in evidence.

*Measurements.*—Total length, 110 millimeters; snout to vent, 62; width of head, 9; greatest width of body, 7.5; foreleg, 15; hind leg, 23.

*Remarks.*—It is with great hesitancy that I have referred this species to the genus *Luperosaurus*, since it is unlike other species of that genus, in having a compressed body with a very narrow abdominal region. It is possible that it should be made the type of a new genus.

*Lepidodactylus aureolineatus* sp. nov.

*Diagnosis.*—Preanal and femoral pores arranged in a continuous angular series, 19 on each side; a narrow, brilliant golden line from tip of snout through eye to some distance behind eye; tail subcylindrical, with a sharp lateral edge, somewhat flattened on ventral surface.

*Type.*—No. 1775, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

*Description of type.*—Rostral entering the nostril; 2 conjoined supranasals bordering the nostril above; a large postnasal; a large irregular internasal separated from the supranasals by a row of small scales; scales behind the postnasal much enlarged; mental very small; 11 upper and 10 lower labials; chin shields numerous, roundish, and subequal in size; no median groove in the forehead; tail subcylindrical, flattened below, serrated on the edge, tapering gradually.

*Color in life.*—Color changeable. When first taken, the back was dark brown with a series of reddish green spots beginning on the middle of the back and continuing more distinctly to the end of the tail; a narrow, bright, golden yellow line from the tip of the snout through the eye, extending to near the insertion of the front leg; tip of tongue black; belly powdered with brown. After being kept for some time, these colors changed markedly. The back became yellowish green, the spots indistinct, and blackish dots appeared about the latter; the abdomen became green, and most of the brown disappeared. When first taken, the tail was marked with reddish brown spots; on the underside brick red, powdered with brown, with indications of

narrow horizontal lines. No change was observed in the color of the tail.

*Measurements.*—Total length, 76 millimeters; snout to vent, 34; width of head, 7; foreleg, 9; hind leg, 15.

*Remarks.*—This species is allied to *Lepidodactylus lugubris*, but differs in the following details: There is no groove between the eyes, there is a much larger series of pores, there is a brilliant golden line through the eye, and the first row of chin shields is smaller than the second. From *L. labialis* it differs in the presence of femoral pores. A second specimen taken at the same locality has a regenerated tail, which is peculiar in its resemblance to that of *L. planicaudus*. The tail is especially flattened, with a free, serrated, lateral edge, the sides of which are parallel for some distance, and then taper rapidly. It is a male and agrees in all other details with the type. Stejneger does not state specifically whether pores are present in his species or not, but it is probable that it agrees with *L. lugubris* in this point. A small female specimen from the type locality agrees with the type save in the presence of pores; however, there is a series of somewhat enlarged scales equal in number to the pores in the male. This form is arboreal, and specimens were taken from the tops of felled trees. Changes in colorations and markings occur very rapidly, but the golden line through the eyes is invariable. One specimen, found on a floating branch in the river, was light yellow-green without markings. Ten specimens were collected.

*Emoia ruficauda* sp. nov.

*Diagnosis.*—Lower eyelid with an undivided transparent disk; frontoparietal single; interparietal present; supranasals widely separated, bordering nostril; 5 golden yellow lines on the body; tail pale red.

*Type.*—No. 1778, adult female, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

*Description of type.*—Rostral forming a straight broad suture with the frontonasal, which is much broader than long; latter in contact with the frontal; frontal wide, little more than half as long as the parietal region; frontoparietal single, interparietal small; 4 supraoculars, the second largest; 7 or 8 superciliaries; 2 large nuchals; nostril pierced between 3 nasals; 7 upper labials, fifth very large; 6 lower labials; 2 loreals; 2 superimposed preoculars; 4 much enlarged temporals, the one

bordering the parietal largest; 3 chin shields behind the mental, second and third divided; 4 enlarged preanals; lamellæ under digits very numerous, close together except the distal part under which the lamellæ are broad and long; 62 under fourth toe; extended leg scarcely reaches the elbow; 26 rows of scales around the body, dorsals very large; ear opening moderate, obliquely oval.

*Color in life.*—Body coal black above with 5 golden yellow lines on the back; the median line begins on the snout and continues only to the sacral region; the dorsal-lateral lines begin just in front of the eyes and are lost on the tail; the lateral lines begin on the upper labials and continue to the groin; below bluish white; tail bright vermilion. Colors of young and adult the same.

*Measurements.*—Total length, 129 millimeters; snout to vent, 50; width of head, 12; foreleg, 15; hind leg, 22.

*Remarks.*—This species was fairly common in the upper Agusan Valley. It is very conspicuous and usually is seen in the tall grass near the rivers and lakes. A single specimen was observed at Butuan near the mouth of Agusan River. Several specimens from the type locality agree with the type in all essential details.

*Sphenomorphus mindanensis* sp. nov. Plate I, figs. 1 and 2.

*Diagnosis.*—Frontoparietal divided; interparietal present; lower eyelid scaly; 32 scales around the body; ear opening much smaller than eye opening; adpressed limbs barely touching.

*Type.*—No. R. 1690, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September, 1912; E. H. Taylor, collector.

*Description of type.*—Rostral twice as broad as high; the width equal to that of the first labial; frontonasal forming a suture with the rostral and frontal; prefrontals large, separated; frontal nearly as broad as the supraocular region; frontoparietal distinct, elongate; parietals forming a suture behind a moderate interparietal; 5 supraoculars, the last much the smallest; 2 small scales inserted between the parietal and the last ocular; 8 or 9 superciliaries; nasal large, with nostril piercing it, followed by 2 or 3 loreals, the first highest; 7 upper labials, sixth much the largest; fifth low but long; a series of small suboculars, one entering some distance between the fourth and fifth supralabials; a large temporal bordering the parietal is bordered by 5 other enlarged scales; 2 enlarged preanals; 32 scale rows about the body; about 66 dorsal scales from occiput to above the vent in

a longitudinal row; diameter of eye much less than distance from eye to end of snout; auricular opening distinct; tympanum more or less deeply sunk; tail very slightly compressed.

*Color in life.*—Above light brown with a more or less regular series of indistinct, roundish, light yellowish brown spots; lateral ground color dark brown with a few small, irregular, yellowish white spots; tail similar in color to the back with larger light spots on the sides; entire ventral surface of the body immaculate creamy white.

*Measurements.*—Total length, 115 millimeters; snout to vent, 48; foreleg, 10; hind leg, 15.5; width of head, 7; greatest width of body, 8.

*Remarks.*—This species seems closely allied to *Sphenomorphus jagori*, but differs from it in being very much smaller, in the proportional lengths of the legs being different, and in having fewer scale rows. A female containing eggs is slightly smaller than the type, but otherwise the 2 specimens are similar. This species is very rare. Only these 2 specimens were seen during a year and a half at Bunauan.

*Sphenomorphus coxi* sp. nov. Plate I, figs. 3 and 4.

*Diagnosis.*—Frontoparietal single; prefrontals not in contact; 5 supraoculars; adpressed hind legs fail to reach beyond the elbow; frontal as broad as, or slightly broader than, the supraocular region; last 3 labials with distinct yellow spots.

*Type.*—No. 1782, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

*Description of type.*—Rostral moderate, high, forming a short suture with the frontonasal, which is much wider than long, and in contact with the frontal; prefrontals not widely separated; frontoparietal single, followed by a narrow interparietal; nostril pierced in a single nasal and followed by 2 loreals; 2 preoculars, superimposed; 2 narrow elongate scales above the fourth and fifth labials; 5 supraoculars followed by 4 or 5 small scales inserted between the parietal and fifth supraocular, although not entirely separating them; a very much enlarged temporal bordering the parietal, with 2 or 3 smaller temporals touching its lower edge and bordering the labials; 7 upper labials, seventh largest; 6 lower labials, last much the longest; ear opening large, nearer the foreleg than the end of the snout; several pairs of chin shields; 36 rows of scales around the body; 22 lamellæ under the fourth toe; 2 enlarged preanals; medial row of scales

under the tail only slightly enlarged; adpressed hind leg fails to reach the adpressed elbow of the foreleg.

*Color in life.*—Above reddish brown with a series of about 12 darker bands across the body, indistinct above, but darker on the sides, especially on the head and neck, where the ends appear as a series of large black spots; a series of light spots on the labials, those on the last 3 labials bright yellow; tail variously barred with very narrow indefinite bars of a darker color; lower part of the tail dull purplish pink; small brown spots on the neck; belly immaculate. In young individuals the tail is pinkish.

*Measurements.*—Total length, 166 millimeters; snout to vent, 66; width of head, 11; width of body, 14; foreleg, 18; hind leg, 25.

*Remarks.*—This species superficially resembles *Sphenomorphus jagori* from which it is easily distinguished by the undivided frontoparietal. *Sphenomorphus coxi* is common in the swamps and on the sides of the low mountains near Bunauan. Twenty-six specimens were collected. The species is named for Dr. Alvin J. Cox, director of the Bureau of Science.

*Sphenomorphus curtirostris* sp. nov.

*Diagnosis.*—Limbs well developed; lower eyelid scaly; tympanum distinct; no supranasals; nostril pierced in a single large nasal; snout short and blunt; frontoparietals fused in a single large plate; parietals forming a suture behind the internasal; frontonasals separated or forming a suture.

*Type.*—No. R. 1695, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September 8, 1912; E. H. Taylor, collector.

*Description of type.*—Rostral twice as wide as high, narrowed on the ends to the width of the first labial; frontonasal twice as broad as long, forming a broad suture with the rostral; prefrontals narrowly separated, hexagonal in shape; width of the frontal equal to, or slightly larger than, the supraocular region; first 2 supraoculars touching the frontal; 4 supraoculars (5 on the left side); nasal large, bordered behind by 2 loreals, superimposed; diameter of eye equal to the distance from eye to end of snout; frontoparietal a single plate; parietals forming a long suture behind the interparietal; 7 upper labials unequal in size; 2 or 3 rows of rather large unequal scales separating the labials from the eye; a very large temporal bordering the parietal; bordered behind and below by 5 enlarged scales; 10

or 11 superciliaries; a rather large scale inserted between the prefrontal and the first supraocular; 6 lower labials; mental twice as wide as high, followed by a very large unpaired chin shield; 2 or 3 pairs of enlarged chin shields behind the latter; auricular opening large, tympanum not deeply sunk; hind leg equal to the distance from the foreleg to the snout; adpressed hind leg fails to reach the elbow of adpressed foreleg; toes somewhat compressed, with transverse, smooth lamellæ, 14 under the fourth toe; heel bordered by several enlarged scales; 40 rows of smooth scales around the body, largest on the ventral side; tail somewhat longer than head and body, slightly compressed, tapering to a sharp point.

*Color in life.*—Body above variegated yellowish brown, with a median row of narrow, quadrangular, chocolate-brown spots, continuing in a median line from the head to the sacral region; 2 or 3 narrow indistinct brownish lines on either side of the median spots; a wide dark brown lateral line begins on the snout, continues through the eye along the side to the hind leg, more or less dove-tailed with the lighter dorsal color covering the entire side of body; tail of somewhat lighter color with irregular darker blotches on the sides; arms and legs mottled above; ventral surface yellowish white with small brown spots, largest and most numerous under the tail.

*Measurements.*—Total length, 98 millimeters; snout to vent, 44; width of head, 7; foreleg, 10.5; hind leg, 15.

*Remarks.*—This form is closely allied to *Lygosoma decipiens* Boulenger and to *Sphenomorphus steeri* Stejneger. Specimens of both species are at hand for comparison. From the former it differs in markings, the width of the head, the size of the preanals, and in the number of scales rows; from *S. steeri* it differs chiefly in size. Several specimens of this species from the type locality agree in essential details, save that the nasals are separated in about one half of the specimens and form a suture in the others. This species is common on the low mountains near Bunauan.

*Sphenomorphus palustris* sp. nov.

*Diagnosis.*—Frontoparietal divided; 6 supraoculars, the last 2 divided; lower eyelids scaly; ear opening large, round; tympanum not deeply sunk; frontal slightly longer than the parietal region; 40 scale rows around the body; side of head barred with white.

*Type.*—No. 1687, Bureau of Science collection; Bunauan, Agu-

san Province, Mindanao, September 16, 1912; E. H. Taylor, collector.

*Description of type.*—Rostral flattened above, broader than high, forming a narrow suture with the frontonasal; prefrontals nearly square, not meeting; frontal long, very narrow behind; not wider than the supraorbital region, but longer than the parietal region; frontoparietal plate divided; parietals forming a suture behind the elongated interparietal; both ends of the latter sharply pointed; supraoculars 6, the last 2 divided; nasal large, touching first 2 labials; an elongate loreal immediately behind followed by a second loreal, larger than the first; 2 enlarged preoculars; 8 upper labials, the seventh largest; 7 or 8 lower labials; mental moderate, followed by 2 chin shields, the second divided; a row of 3 enlarged suboculars under the fore part of the eye with a smaller series beginning behind these and continuing to the supraoculars behind the eye; 9 superciliaries, the first largest, the last 5 subequal; a large temporal bordering the parietal, with 2 temporals below, and 2 behind the lower end, subequal in size; 40 rows of scales around the body, laterals smallest; scales on the hind limb greatly reduced; 30 keeled lamellæ below the fourth toe; 2 somewhat enlarged transverse plates on the wrist; 2 enlarged preanals; diameter of orbit equal to length of snout; hind leg pressed forward, reaches to near the elbow of adpressed foreleg.

*Color in life.*—Mottled brown above with scales of darker and lighter shades; sides darker, with indistinct, irregular, bluish bars, distinguishable across the back; area in front of the arm bluish; head uniform light brown above; 3 white transverse bars on the side of the head and 3 or 4 dark-chocolate bars alternating with the white; the most distinct white line begins on the white lower eyelid and continues down through the seventh labial and is lost on the chin; tail and hind leg dark bluish to black; chin creamy white, neck with a bluish tinge; abdomen dirty brownish white.

*Measurements.*—Total length (tail mutilated and partly regenerated), 159 millimeters; snout to vent, 95; width of head, 16; foreleg, 24; hind leg, 35.

*Remarks.*—This species is related to *S. jagori*, but differs in many essential points. More than 100 specimens of the latter which were taken at Bunauan agree remarkably in scalation and coloration. Two specimens of *S. palustris* were taken several kilometers apart in the large swamp near Bunauan. These 2 specimens agree in scalation, but the coloration of the hind

legs and tail of the cotype is bluish rather than black. There is no trace in this species of the distinctive markings of *S. jagori*.

*Dasia griffini* sp. nov. Plate I, figs. 5 and 6.

*Diagnosis*.—Similar to *Dasia semicineta*, but with a very much shorter head and more pointed snout; much narrower across the orbital region; the frontal longer than frontoparietal and interparietal together; scales in 26 rows around the body; scales larger than in *D. semicineta*; supranasals with a broad suture.

*Type*.—No. 1777, Bureau of Science collection; Taytay, Palawan; L. E. Griffin, collector.

*Description of type*.—Rostral normal, much wider than high; supranasals present, forming a suture; frontonasal broader than long, touching the frontal; frontal long and narrow; interparietal present, separating the parietals; frontoparietal divided; 3 nuchals present; nasal rectangular, as long as the first labial, followed by 2 loreals subequal in size; 6 or 7 superciliaries; 4 supraoculars; 7 upper labials, fifth largest; 7 lower labials; ear opening small with 1 large anterior lobule; temporals small, 3 or 4 in number; 18 lamellæ under the fourth toe; adpressed hind leg fails to meet the wrist of adpressed foreleg.

*Color in alcohol*.—Greenish drab above with a series of 15 transverse bars of black beginning midway on the side; tail indistinctly mottled; a lighter streak dorsolaterally along the body to base of the tail; below this line black; under part of the body immaculate light blue.

*Measurements*.—Total length (tail regenerated), 224 millimeters; snout to vent, 111; foreleg, 30; hind leg, 39.

*Remarks*.—Two other specimens were taken in Palawan which agree with the type in scales and markings, but differ somewhat in coloration. The 3 specimens are adult. This species is easily distinguished from *Dasia semicineta* by the much shorter head, the smaller number of scale rows, and the markings. This species is named for its collector, Dr. Lawrence E. Griffin, formerly professor of zoölogy in the University of the Philippines.

*Dasia semicineta* (Peters). Plate I, figs. 7 and 8.

*Euprepes (Titiqua) semicinetus* PETERS, Monatsberichte d. Acad. d. Wissensch. in Berlin (1867), 21.

Boulenger has referred this species to *Dasia olivacea* Gray. The taking of a number of specimens has confirmed my belief



in the distinctness of the species. The specimens collected agree in scales and proportions, but vary in markings and coloration with the age. They agree in practically all details with Peters's description. The following is a description of a large adult male:

*Description.*—Rostral high; the supranasals constantly form a suture; prefrontal large, as wide as long, making a narrow suture with the frontal; prefrontals narrowly separated; frontal bordered by the first 2 supraoculars; first superciliary large, easily mistaken for a supraocular; frontoparietals and interparietal distinct, the latter separating the parietals; a pair of nuchals; nasal rectangular, as long as first labial, followed by 2 loreals, second much the larger; 2 enlarged scales under the fore part of the eye; 4 supraoculars, second largest; 7 superciliaries, first very large; 7 supralabials, fifth largest, entering the eye; 3 temporals the size of the seventh labial; mental large, followed by an unpaired chin shield and 2 large paired shields; 7 lower labials; ear opening small, nearer the foreleg than the snout; 30 rows of scales around the body; preanals somewhat enlarged; the adpressed hind leg reaches beyond the wrist of adpressed foreleg. Dorsal scales, at least those on the posterior half of back, tricarinate, occasionally quincarinate.

*Color in life.*—Owing to the extreme variation I append descriptions of specimens of various ages. Young (extreme tip of tail regenerated): Length, 132 millimeters. Body above glossy coal black with a series of brilliant orange-yellow bars from the tip of the snout to the end of the tail; 3 bars in front of eye, first on the rostral; 2 in front of eye; 2 between the eyes, having only a single representative below the eye; the sixth lies across the occipital region passing through the corners of the mouth; 2 or 3 bars across the neck; 6 on the body in front of the hind leg, with 13 much wider bars on the tail; the latter bars are more orange than yellow; legs and digits barred with canary yellow; regenerated tail brick red; below, the bars widen and lose themselves in the immaculate canary yellow of the abdomen, giving the appearance ventrally of a series of black belts, the ends of which are pointed and fail to meet. In a specimen 180 millimeters long (snout to vent, 76 millimeters), these markings are still very distinct; however, in a specimen measuring from snout to vent 92 millimeters (tail broken and regenerated), the characteristic markings of the young are scarcely distinguishable save a series of lateral bars of ocellated black and cream, scarcely traceable dorsally. These are the remains

of the orange bars across the body of the young; below, bluish yellow. In a large adult (275 millimeters long) the color is olive brown above with a series of 6 lateral bars of ocellated scales, widely separated from their fellows dorsally. Traces of annulations are visible on the tail; bluish beneath. Other specimens agree in markings and coloration with these according to their ages.

Specimens of this species were collected from the tops of large felled trees. It is a retiring species and is never observed on the ground.

*Tropidophorus rivularis* sp. nov. Plate I, figs. 9 and 10.

*Diagnosis*.—Head scales feebly rugose; 4 supraoculars; no supranasals; a series of small granular scales inserted in a groove above the front labials, separating the second loreal and the anterior suboculars from the labials; 2 interparietals, the first small, followed by an elongate interparietal completely separating the parietals; sixth labial very large, below the eye.

*Type*.—No. 1780, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

*Description of type*.—Rostral small, little wider than high; prefrontals forming a broad suture; frontal elongate, narrower than the supraocular region; nasal small, followed by 2 loreals, the second loreal separated from the labials by a series of granular scales; 5 labials in front of subocular, the first smallest; 8 upper labials, the sixth much the largest; mental small, equal in size to the rostral; a single unpaired chin shield behind the mental, followed by 2 paired shields lying close together, and a third pair separated by 3 elongate scales; temporals 5, slightly enlarged, none as large as the seventh labial; auricular opening large, more than half the diameter of eye; dorsal scales strongly unicarinate; a single large preanal; 30 scale rows on the body; adpressed hind leg reaches beyond the elbow of the adpressed foreleg.

*Color in life*.—Body above reddish brown, barred across the back with a series of indistinct, irregular cross bands, not visible on the sides; sides darker with traces of light bars of bright yellow; scales flecked with small yellow or orange spots; an orange spot behind the ear, another between the eye and the ear; head lighter brown without markings; lips and underside of throat and chin grayish blue; abdomen and underside of limbs yellowish white; under base of tail, pinkish.

*Remarks*.—This species is related to *T. misamisensis* Stejneger, but differs in having a double interparietal, in the character

of the temporals, and in having a series of small scales in a groove above the front upper labials. These characters appear to be constant and are present in both young and adult specimens of a large series. The species is common near small mountain streams where it lives under rocks and logs, but takes to the water at once on being disturbed. A specimen was observed to swim under water in a clear pool for about 7 meters; it then took refuge under a large rock, where it remained for more than two minutes. These lizards swim by alternating movements of the arms and legs and an undulating movement of the body and tail.

*Dibamus argenteus* sp. nov. Plate I, figs. 11 and 12.

*Diagnosis*.—Snout covered with a single large rostral, pierced by the nostril; body elongate with limbs absent; 24 scale rows around the body, scales equal on body, but slightly smaller on the tail. Width of tail contained in its length five and two-thirds times.

*Type*.—No. 1691, Bureau of Science collection; Butuan, Agusan Province, Mindanao, May, 1913; E. H. Taylor, collector.

*Description of type*.—Snout covered with a single large rostral pierced by elongate nostrils; a strong suture emerges from the nostril and continues backward in an irregular line to a point opposite the eye; behind the rostral all scales imbricate; a frontal shaped like a double convex lens forms a suture with the rostral; bordered on each side by 2 oculars and behind by a somewhat larger interparietal scale, as wide as, and a little longer than, the frontal; oculars elongated, slightly smaller than the frontal; eye appears as a clouded black dot, opposite the suture in rostral; behind the ocular is a somewhat enlarged scale and below it an enlarged labial forming a suture with the rostral; mental narrow, a little longer than wide, with 2 enlarged labials on each side extending farther back than the rostral; these scales followed on each side of the head by 2 elongate scales opposite the first upper labial; rostral, mental, and lower labials noticeably thickened; 24 scale rows around the body; 250 scales in a longitudinal line from head to tail; scales around the body equal in size, slightly smaller on the tail; preanal small, but preceded by 2 or 3 large scales.

*Color in life*.—Light chocolate brown above and below, with irregular blotches of silvery gray, 2 of which entirely encircle the body; anal region creamy white; frontal plate silvery gray; rostral, mental, and lower labial light.

*Measurements.*—Total length, 125 millimeters; snout to vent, 108; tail, 17; width of head, 4.5.

*Remarks.*—While no specimen of *D. novæ-guineæ* is at hand for comparison, I have no doubt as to the distinctness of this species. The difference in the proportional length of the body and tail is especially evident, while the position and distinctness of the eye, the smaller size of the interparietal, and the coloration are all distinctive characters. The head is not depressed, but is the same thickness from end of snout to the neck. A single specimen was found on a small rocky hill emerging from the great swamp not far from the mouth of Agusan River. This is the first record of this family and genus in the Philippines. A second specimen has been taken on Canlaon Volcano on the Island of Negros, at an elevation of about 915 meters.

## ILLUSTRATIONS

[Drawings by T. Espinosa]

### PLATE I

- FIGS. 1 and 2. *Sphenomorphus mindanensis* sp. nov.  $\times 2$ . From the type, No. 1690.
- 3 and 4. *Sphenomorphus coxi* sp. nov.  $\times 1$ . From the type, No. 1782.
- 5 and 6. *Dasia griffini* sp. nov.  $\times 1$ . From the type, No. 1777.
- 7 and 8. *Dasia semicineta* Peters.  $\times 1$ .
- 9 and 10. *Tropidophorus rivularis* sp. nov.  $\times 1$ . From the type, No. 1780.
- 11 and 12. *Dibamus argenteus* sp. nov. Much enlarged. From the type, No. 1691.

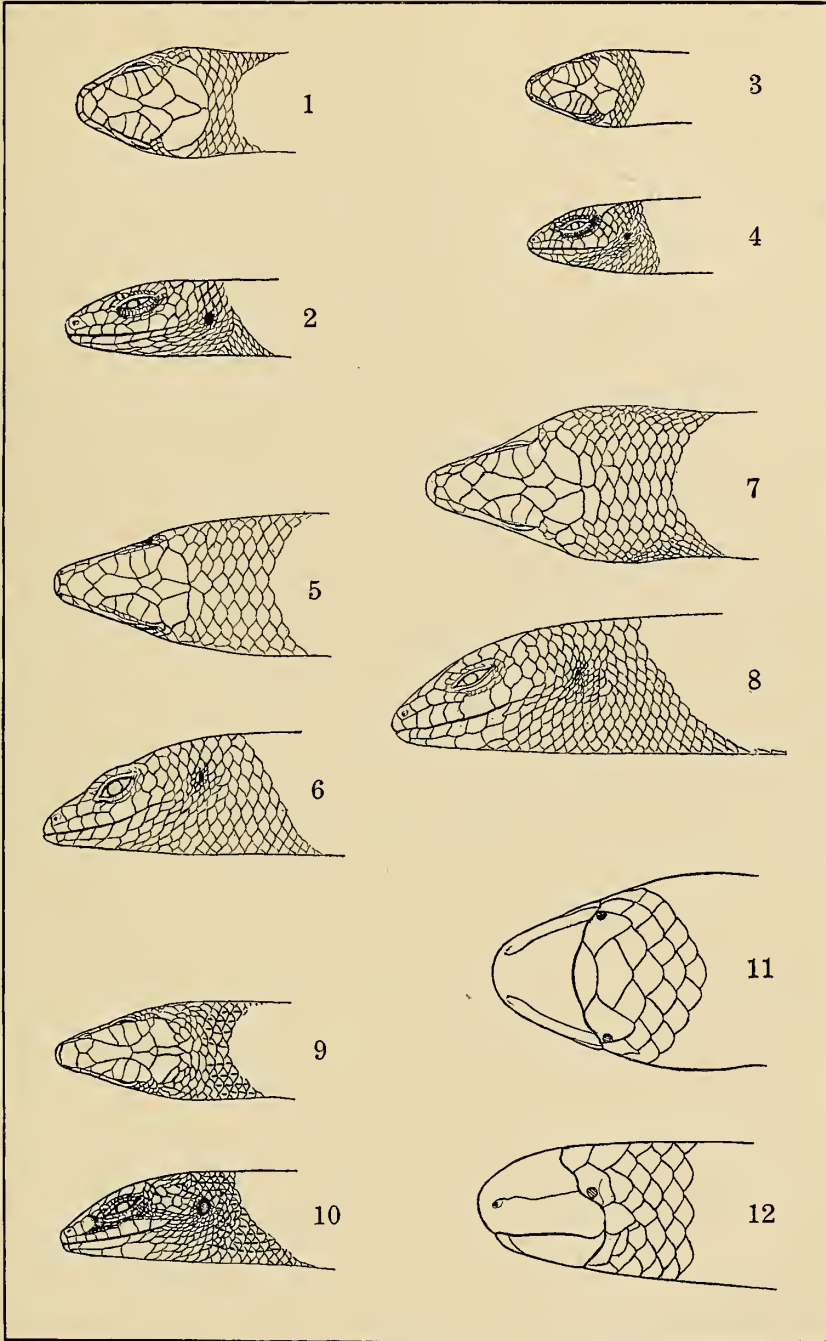


PLATE I.

Figs. 1 and 2. *Sphenomorphus mindanensis* sp. nov. 3 and 4. *Sphenomorphus coxi* sp. nov. 5 and 6. *Dasia griffini* sp. nov. 7 and 8. *Dasia semicinota* Peters. 9 and 10. *Tropidophorus rivularis* sp. nov. 11 and 12. *Dibamus argenteus* sp. nov.